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Knowledge, attitude and practices (KAP) regarding tooth pain management and endodontic treatment in semi-urban Indian communities

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Abstract:

Pulpal and periapical diseases are major causes of odontogenic pain and frequently necessitate endodontic intervention. Therefore, it is of interest to evaluate the Knowledge, Attitude and Practices (KAP) regarding tooth pain management and endodontic treatment in semi-urban Indian communities. A community-based cross-sectional study was conducted among 866 adults aged ≥ 18 years with a history of tooth pain in the past. KAP scores were categorized and statistical analysis was performed. Thus, data shows a significant gap between awareness and current practices for endodontic among semi-urban populations.

Keywords: Knowledge, attitude, practice (KAP), tooth pain, endodontic treatment, semi-urban population, oral health behavior

Background:

Pulpal and periapical diseases are among the most frequent causes of severe odontogenic pain worldwide and remain a significant concern in endodontic practice. Contemporary clinical guidance emphasizes that management of pulpal and apical pathology should follow a structured, evidence-based approach incorporating accurate diagnosis, timely intervention and appropriate endodontic therapy to prevent disease progression and complications [1]. Despite these recommendations, tooth pain continues to be a leading cause of emergency dental visits, reflecting persistent gaps in timely care-seeking behavior and treatment accessibility. Effective management of endodontic pain extends beyond technical procedures and includes pharmacological and clinical decision-making strategies aimed at reducing patient discomfort. Recent evidence highlights evolving paradigms in emergency endodontic care, with emphasis on early intervention and optimized treatment protocols to improve patient outcomes [2]. In addition, intracanal medicaments such as calcium hydroxide, along with other therapeutic agents, have showed variable effects on post-operative pain reduction, although clinical heterogeneity persists across studies [3]. Pharmacological agents, including NSAIDs and combination drug therapies, play a central role in acute endodontic pain control; however, their use in routine practice is often inconsistent and not fully aligned with guideline-based recommendations [4]. Advancements in endodontic procedures, including adjunctive laser therapy and regenerative approaches such as pulpotomy in symptomatic irreversible pulpitis, have expanded treatment possibilities and improved pain-related outcomes in selected cases [5, 6]. Nevertheless, variability in clinical outcomes remains evident across different treatment modalities, including single-visit versus multiple-visit root canal therapy and adjunctive drug use for pain control [7-9]. Additionally, flare-ups and post-operative pain are influenced by multiple biological and procedural factors, including medicament selection, antimicrobial use and inflammatory responses, further complicating standardized pain management protocols [10, 11]. Differences in anesthetic efficacy and procedural approaches also contribute to variability in patient-reported pain experiences during and after endodontic treatment [12-14]. Alongside clinical considerations, understanding practitioner behavior is essential for improving endodontic care delivery. A multicenter study evaluating dental practitioners revealed considerable variation in knowledge,

attitude and practice regarding adult dental pain management, indicating inconsistent adherence to evidence-based protocols in routine clinical settings [15]. Therefore it is of interest to report to evaluate the Knowledge, Attitude and Practices (KAP) regarding tooth pain management and endodontic treatment in semi-urban Indian communities.

Materials and Methods:

This study was conducted as a community-based, cross-sectional Knowledge, Attitude and Practices (KAP) survey to assess awareness and behavior regarding tooth pain management and endodontic treatment among adults residing in semi-urban Indian communities. The study population included individuals aged ≥ 18 years that had experienced tooth pain within the preceding 12 months. Healthcare professionals, individuals with cognitive impairment and those who did not provide informed consent were excluded from the study. The sample size was calculated as 866 participants using the standard single population proportion formula ($n = Z^2 \times p(1 - p) / d^2$), where $Z = 1.96$ at 95% confidence level, $p = 0.5$ (assumed prevalence of adequate knowledge) and $d = 0.033$ as the margin of error, which yielded the required minimum sample size after accounting for non-response. A multistage sampling technique was employed to select semi-urban clusters, followed by systematic household selection and recruitment of eligible participants until the target sample size was achieved. Data were collected using a pre-validated structured questionnaire consisting of four sections: socio-demographic details, knowledge regarding tooth pain and endodontic treatment, attitude toward dental care-seeking and practices including self-medication and treatment behavior. The questionnaire was prepared in English, translated into the local language and back-translated to ensure content validity.

Results:

A pilot study was conducted on 10% of the total sample size to test clarity, reliability and feasibility and necessary modifications were made prior to final data collection. Knowledge, attitude and practice scores were computed using a standardized scoring system (Table 1). KAP questionnaire structure, items and scoring system. Data were analyzed using descriptive statistics, chi-square tests and multivariate logistic regression to identify predictors of adequate KAP levels, with statistical significance set at $p < 0.05$. Ethical approval was obtained from the

Institutional Ethics Committee and written informed consent was obtained from all participants prior to enrolment. As shown in **Table 2**, the study included a total of 866 participants with a fairly balanced distribution across socio-demographic variables. The largest proportion of participants belonged to the 31–45 years age group (36.0%), followed by 46–60 years (27.7%), 18–30 years (24.7%) and >60 years (11.6%). Females (53.6%) slightly outnumbered males (46.4%). In terms of education, most participants had completed secondary education (39.5%), followed by graduates (37.6%) and primary education (22.9%). Regarding occupation, 47.3% were employed, while 52.7% were unemployed. Statistical analysis revealed significant associations between all socio-demographic variables and distribution of participants (age, gender, education and occupation), with p-values of 0.001, 0.013, <0.001 and 0.020 respectively, indicating a heterogeneous distribution of study participants across key demographic categories. As depicted in **Table 3**, the overall distribution of Knowledge, Attitude and Practice (KAP) levels among the study participants revealed that a substantial proportion of individuals demonstrated only moderate or suboptimal KAP regarding tooth pain management and endodontic treatment. For knowledge, the largest group fell under the moderate category (41.6%), followed by good knowledge (33.5%) and poor knowledge (24.9%), with a mean score of 7.8 ± 2.4 . Similarly, attitude assessment showed that 39.3% of participants exhibited a neutral attitude, while 35.8% had a positive attitude and 24.9% showed negative attitudes,

with a mean score of 32.4 ± 6.1 . In terms of practice, the majority of participants demonstrated moderate practices (43.6%), while only 30.9% reported good practices and 25.4% showed poor practices, with a mean score of 5.6 ± 1.8 . All domains showed statistically significant differences across categories ($p < 0.001$), indicating a non-uniform distribution of KAP levels within the population. As shown in **Table 4**, multivariate logistic regression analysis demonstrated a significant association between socio-demographic variables and KAP outcomes regarding tooth pain management and endodontic treatment. Older age (>45 years) was significantly associated with lower odds of good knowledge (OR = 0.62, 95% CI: 0.44–0.88), positive attitude (OR = 0.68, 95% CI: 0.49–0.95) and good practice (OR = 0.71, 95% CI: 0.51–0.99), indicating poorer KAP levels among older participants. Female gender showed a statistically significant association only with positive attitude (OR = 1.34, 95% CI: 1.02–1.76), while associations with knowledge and practice were not significant. Higher educational status emerged as the strongest predictor across all domains, significantly increasing the likelihood of good knowledge (OR = 2.41), positive attitude (OR = 2.05) and good practice (OR = 2.18) ($p < 0.001$). Similarly, employed participants demonstrated significantly better KAP scores compared to unemployed individuals. Importantly, participants with a history of previous dental visits showed markedly higher odds of good knowledge (OR = 2.76), positive attitude (OR = 2.48) and good practice (OR = 2.91), highlighting the strong influence of prior dental exposure on behavioral outcomes.

Table 1: KAP Questionnaire structure, items and scoring system

Domain	No. of Items	Question Type	Sample Questions	Response Options	Scoring System	Interpretation (Cut-off)
Knowledge (K)	10–12	MCQ / Yes-No	Tooth pain causes, awareness of RCT, complications of untreated caries, role of antibiotics	Correct / Incorrect / Don't know	Correct = 1, Incorrect/Don't know = 0 (Total: 0–12)	Good ≥75%, Moderate 50–74%, Poor <50%
Attitude (A)	8–10	5-point Likert scale	Immediate dental visit for pain, perception of RCT pain, preference for extraction, avoidance of dental care	Strongly agree → Strongly disagree	Positive items: 5–1; Negative items reverse scored (Total: 8–50)	Positive ≥75%, Neutral 50–74%, Negative <50%
Practice (P)	8–10	MCQ / Yes-No	Self-medication, delay in consultation, use of analgesics/antibiotics, preference for home remedies	Always / Sometimes / Never	Healthy practice = 1, Unhealthy = 0 (Total: 0–10)	Good ≥75%, Moderate 50–74%, Poor <50%

Table 2: Socio-demographic characteristics of study participants (n = 866)

Variable	Category	Frequency (n)	Percentage (%)	χ ² value	p-value
Age (years)	18–30	214	24.7	18.42	0.001*
	31–45	312	36.0		
	46–60	240	27.7		
	>60	100	11.6		
Gender	Male	402	46.4	6.21	0.013*
	Female	464	53.6		
Education	Primary	198	22.9	32.15	<0.001*
	Secondary	342	39.5		
	Graduate	326	37.6		
Occupation	Employed	410	47.3	9.88	0.020*
	Unemployed	456	52.7		

*Statistically significant at $p < 0.05$

Table 3: Knowledge, Attitude and Practice (KAP) Levels among Participants (n = 866)

Domain	Level	Frequency (n)	Percentage (%)	Mean ± SD	χ ² value	p-value
Knowledge	Good	290	33.5	7.8 ± 2.4	41.26	<0.001*
	Moderate	360	41.6			
	Poor	216	24.9			
Attitude	Positive	310	35.8	32.4 ± 6.1	38.19	<0.001*
	Neutral	340	39.3			
	Negative	216	24.9			

Practice	Good	268	30.9	5.6 ± 1.8	44.77	<0.001*
	Moderate	378	43.6			
	Poor	220	25.4			

*Statistically significant at $p < 0.05$

Table 4: Association of KAP Scores with socio-demographic variables (Multivariate Logistic Regression)

Variable	Good Knowledge (OR, 95% CI)	p-value	Positive Attitude (OR, 95% CI)	p-value	Good Practice (OR, 95% CI)	p-value
Age (>45 yrs)	0.62 (0.44–0.88)	0.006*	0.68 (0.49–0.95)	0.021*	0.71 (0.51–0.99)	0.043*
Female gender	1.28 (0.98–1.67)	0.067	1.34 (1.02–1.76)	0.036*	1.22 (0.94–1.58)	0.129
Higher education	2.41 (1.78–3.26)	<0.001*	2.05 (1.52–2.76)	<0.001*	2.18 (1.61–2.95)	<0.001*
Employed status	1.39 (1.05–1.84)	0.020*	1.31 (1.00–1.71)	0.049*	1.44 (1.09–1.91)	0.011*
Previous dental visit	2.76 (2.01–3.79)	<0.001*	2.48 (1.81–3.39)	<0.001*	2.91 (2.11–4.01)	<0.001*

*Statistically significant at $p < 0.05$

Discussion:

The present community-based cross-sectional study provides a comprehensive evaluation of Knowledge, Attitude and Practices (KAP) regarding tooth pain management and endodontic treatment in semi-urban Indian populations. The findings highlight a moderate overall level of awareness, suboptimal behavioral practices and significant socio-demographic disparities influencing endodontic health behavior. The observed moderate-to-poor knowledge levels and suboptimal practices reflect a substantial gap between guideline-recommended endodontic care and community-level understanding. Contemporary endodontic guidelines emphasize early diagnosis, structured treatment planning and timely intervention in pulpal and periapical diseases to prevent progression and complications [1]. However, despite such evidence-based recommendations, tooth pain continues to be a major driver of emergency dental visits, often reflecting delayed care-seeking behavior and reliance on symptomatic self-management rather than definitive treatment [2]. This disconnect is further reinforced by the inconsistent use of pharmacological agents and variability in emergency pain management strategies in real-world settings [4]. The present study also showed that a considerable proportion of participants exhibited moderate knowledge and neutral or negative attitudes toward endodontic treatment, particularly root canal therapy. This finding aligns with previous evidence indicating that intracanal medicaments and pharmacological interventions, while clinically effective in reducing post-operative pain, show variable outcomes in practice due to differences in patient compliance, access to care and practitioner-related factors [3, 10]. Moreover, advancements such as laser-assisted endodontics and minimally invasive pulpotomy procedures have expanded therapeutic options; however, their benefits are often underutilized or poorly understood in community settings, particularly in semi-urban populations [5, 6]. In terms of treatment variability, evidence suggests that clinical outcomes and post-operative pain experiences differ significantly between single-visit and multiple-visit root canal therapies, as well as based on the pharmacological regimen used during and after treatment [7–9]. The influence of flare-ups, inflammatory responses and procedural variables further complicates standardized pain control, reinforcing the multifactorial nature of endodontic pain perception and management [10, 11]. Additionally, variability in anesthetic efficacy and procedural success rates contributes to patient discomfort and reinforces negative perceptions regarding

root canal therapy [12–14]. The multivariate analysis of the present study showed that higher educational status and prior dental visits were the strongest predictors of improved knowledge, attitude and practice. This is consistent with findings from practitioner-based research, which also report variability in knowledge, attitude and clinical decision-making in dental pain management settings [15]. Sun *et al.* came to the conclusion that when it came to treating EPLs, oral healthcare professionals showed little understanding, generally positive attitudes and comparatively passive procedures [16]. According to Banik *et al.* research, the study population's clinical application of endodontic irrigation is rather low, despite adequate knowledge and awareness of the technique [17]. Mohan *et al.* came to the conclusion that mass campaigns and healthcare education could improve patient acceptance of RCT and filling as therapeutic alternatives [18]. The strong association between previous dental exposure and improved KAP scores underscores the importance of experiential learning in shaping positive health-seeking behavior. From a clinical perspective, this highlights the role of repeated patient engagement, preventive counseling and reinforcement of treatment benefits in improving acceptance of definitive endodontic care. From a public health and clinical management standpoint, the findings have important implications. The persistence of poor practice patterns-such as delayed dental visits, self-medication with analgesics or antibiotics and preference for extraction over root canal therapy-indicates a critical need for targeted awareness programs. Strengthening primary oral health education in semi-urban regions, integrating pain management counseling into routine dental visits and improving accessibility to endodontic services may significantly reduce preventable tooth loss and emergency burden. Additionally, clinicians should adopt structured patient communication strategies to address misconceptions regarding root canal treatment pain, improve trust and enhance compliance with definitive care.

Conclusion:

We show that semi-urban Indian communities exhibit moderate knowledge, neutral-to-negative attitudes regarding tooth pain management and endodontic treatment. The findings highlight a significant gap between evidence-based endodontic guidelines and real-world patient behaviour. This underscoring the need for targeted oral health education, improved awareness of root canal therapy. This strengthened access to timely dental care to

enhance treatment-seeking behavior and reduce preventable tooth loss.

Advancement to knowledge:

The transition from empirical pain relief to evidence-based clinical protocols is the main focus of advances in dentistry research concerning Knowledge, Attitude and Practices (KAP) in tooth pain management and endodontic therapy. Critical insights into how practitioners comprehend, feel and manage dental pain and root canal therapy are revealed by contemporary KAP surveys and clinical investigations.

Limitation:

The study was limited by its cross-sectional design, which precluded causal inferences between socio-demographic factors and KAP outcomes.

Future perspective:

Longitudinal and interventional community-based oral health programs are recommended to evaluate sustained improvements in knowledge, attitude and endodontic care-seeking behavior.

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